Trend Study 30-26-03

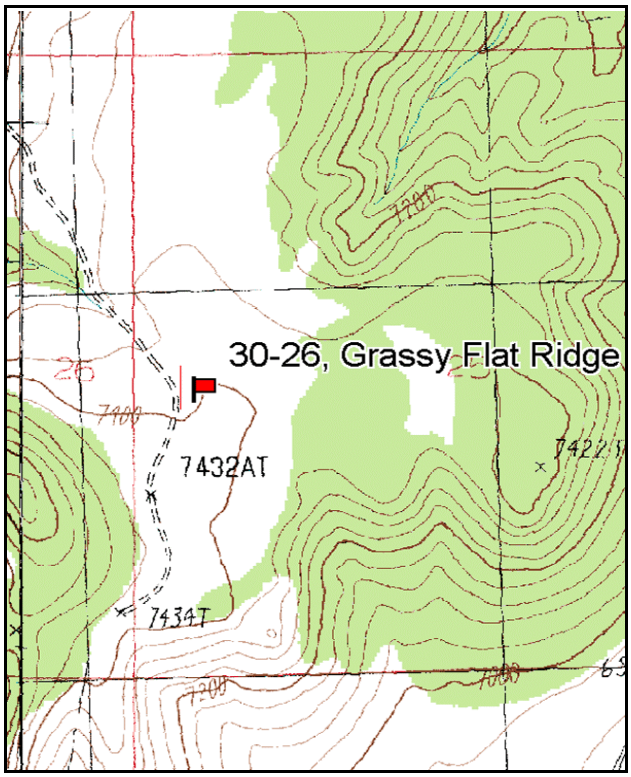
Study site name: Grassy Flat Ridge . Vegetation type: Mountain Brush .

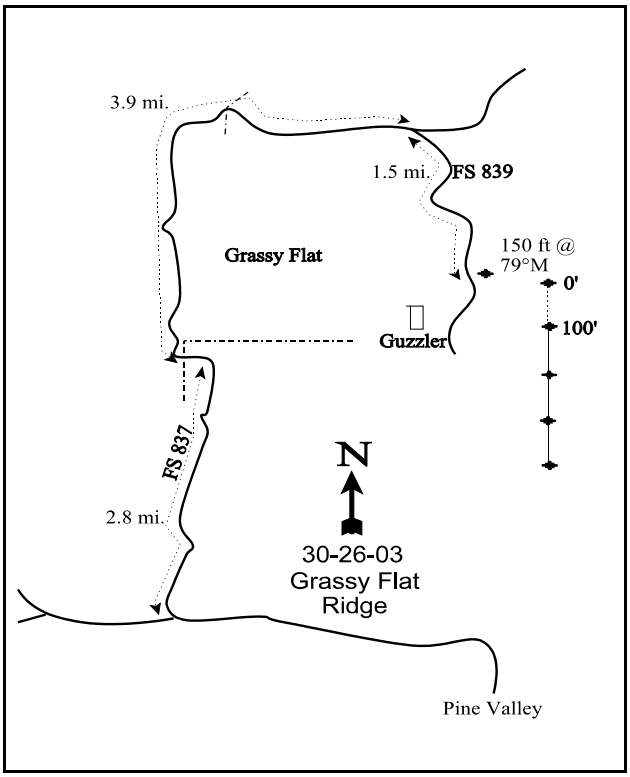
Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (16 & 89ft), line 2 (39ft), line 3 (48ft), line 4 (63ft). Rebar: belt 2 on 1ft, belt 3 on 4ft.

LOCATION DESCRIPTION

From the town of Pine Valley, travel west towards Central 1.5 miles to the dirt road to Pinto. Continue west 0.75 miles to the Gray's Ranch-Grassy Flat Road on the north side (right) of the road. Go north on this road approximately 2.8 miles and turn left. From here, continue on the road for 3.9 miles to Forest Service road #839. Bear right (south) and travel 1.5 miles to a witness post on the left (east) side of the road. A large guzzler can be found further down the road on the right (west) side. From the witness post, the 0-foot stake is 150 feet away at 79 degrees magnetic. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.




Map Name: Grass Valley & Central East

Diagrammatic Sketch

Township 38S , Range 15W , Section 25

GPS: NAD 27, UTM 12S 4147710 N, 279276 E

## DISCUSSION

### Grassy Flat Ridge - Trend Study No. 30-26

The Grassy Flat Ridge trend study is located on a relatively low elevation summer range near the summit of the ridge, lying between the South Fork of Pinto Creek and Grassy Flat. Terrain varies, but the site has a 5% to 10% slope to the west and an elevation of 7,400 feet. The vegetative type is sagebrush-grass with low abundance of seeded grasses. A guzzler is located about 200 yards to the southwest of the study site. Wildlife and livestock use has been reported high in the past, most likely due to the close proximity of the guzzler. Pellet group data taken on the site on June 30, 1998 estimated moderate use by deer with 32 deer days use/acre (79 ddu/ha). No livestock had been on the site yet but use did occur later that summer. Livestock grazing typically occurs from July 1-August 15 on a deferred rotation system. Pellet group data from 2003 estimated 52 deer days use/acre (129 ddu/ha). Most of the use was from spring and early summer. No livestock use was noted when the site was read on May 28th of 2003, but cow use from the previous year was estimated at 7 days use/acre (17 cdu/ha).

Soils are igneous in origin, coarse in texture, and very rocky over most of the area. Effective rooting depth is estimated at almost 12 inches. Texture is a clay loam which is moderately acidic (pH 5.8). Phosphorus may be limiting at 7.2 ppm, when 10 ppm is considered a minimal value for normal plant development. Rock and pavement are abundant on the surface and have increased from 29% to 40% between 1982 and 2003. Erosion was noted as slight and the only active gullies occurred on the road.

The key browse species are mountain big sagebrush and antelope bitterbrush. Sagebrush accounted for 54% of the total browse cover in 1998 and 72% in 2003. Density of big sagebrush was estimated at 2,333 plants/acre in 1982. No seedlings or young plants were encountered. The population increased 64% by 1992. Seedlings and young plants were then very abundant. Density increased an additional 12% by 1998 to 7,260 plants/acre. Seedlings were still abundant and young plants accounted for 43% of the population. The population nearly doubled in 2003 to 13,440 plants/acre. Utilization has been mostly light to moderate over the years with a few individuals displaying heavy hedging. Vigor has been good and percent decadence has remained low.

Antelope bitterbrush has a relatively small population. It increased slightly in density in 1992 and 1998 to around 700 plants/acre, yet it declined in 2003 to 580 plants/acre. Utilization was mostly moderate in 1982, but has been extremely heavy since. Most plants are partly unavailable due to the high level of use. Even with this heavy use, vigor is still normal on most plants and percent decadence was moderately low at 17% in 1998. Percent decadence increased to 31% in 2003. The population has poor recruitment and has decreased in average height and crown measurements since 1998. Annual leader growth, only found in protected areas, averaged only 1 inch. There was no sign of flowering in 2003.

Secondary browse species include Utah serviceberry, dwarf rabbitbrush, and occasional individuals of Gambel oak and curlleaf mountain mahogany. Serviceberry plants also have displayed heavy use but many plants have become partly unavailable due to height. Broom snakeweed, an invader/increaser, also occurs on the site in moderate numbers.

The herbaceous understory is moderately abundant and diverse. Four perennial grasses dominate the grass composition. These include pubescent wheatgrass, mutton bluegrass, bottlebrush squirreltail, and Letterman needlegrass. Forbs are diverse, but the composition consists primarily of increasers, poisonous plants, and other low-growing species of minimal forage value. The most abundant forbs are wild onion, littleleaf pussytoes, and foothill deathcamas. Sulfur eriogonum and Eaton fleabane are also fairly common.

1982 APPARENT TREND ASSESSMENT

A best estimate of soil trend is slightly downward. Erosion and soil loss are not great, but only because of the gentle terrain. Ground cover is generally poor. Vegetative trend appears to also be declining. Both key species are barely holding their own in the face of a rapidly expanding broom snakeweed population. Grass density is good and may be a competitive influence on shrub reproduction. Forb composition is depleted and shows few signs of improvement.

1992 TREND ASSESSMENT

Erosion on the site is slight with an increase in rock and pavement cover and a decrease in bare ground. Ground cover is still poor, but has changed mostly from bare ground to mostly pavement and rock. Basal vegetative cover has increased from 7% to 10%. The grass species are mostly palatable and the composition is good, while the forb species are mostly unpalatable and composition poor. The key browse species, mountain big sagebrush and antelope bitterbrush, have both increased and should be able to tolerate the increase of broom snakeweed. The broom snakeweed population is expanding and should be monitored closely.

TREND ASSESSMENT
soil - stable (3)
browse - slightly up (4)
herbaceous understory - slightly up (4)

1998 TREND ASSESSMENT

Trend for soil is stable with similar ground cover characteristics compared to 1992. Trend for the key browse species is mixed. Mountain big sagebrush displays an upward trend due to a 12% increase in population density, good reproduction, normal vigor, and low percent decadence. Bitterbrush shows a stable to slightly downward trend due to continued extremely heavy use. This use is not only from deer. Cattle using the site will switch from grasses to bitterbrush late in the summer, especially during dry years when the perennial grasses dry out. The bitterbrush population has remained at similar density compared to 1992, but reproduction is limited with just enough young plants to replace decadent & dying plants. With this in mind, trend for browse is considered up due the increase in sagebrush. Trend for the herbaceous understory is slightly down. Sum of nested frequency for both grasses and forbs has declined. Forb composition is still poor.

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - down slightly (2)

2003 TREND ASSESSMENT

Trend for soil remains stable. There is abundant protective ground cover to prevent erosion. Unfortunately, rock and pavement combine to produce 40% of the ground cover which results in high surface soil temperatures. Generally rocky sites like this one give shrubs a competitive advantage, especially during drought years. Trend for browse is up for sagebrush and down for the more preferred bitterbrush, although bitterbrush only contributes 10% of the browse cover. Density of mountain big sagebrush has grown to 13,440 plants/acre. Cover has increased from 9% in 1998 to 15% in 2003. Young recruitment remains extremely high suggesting a continued increase in the population. Bitterbrush has declined 17% in density, is heavily browsed, and has increased in percent decadence to 31%. No seedlings or young plants were sampled

and there was no sign of flowering in 2003. Overall, the browse trend is considered up due to the increase in sagebrush which contributes 72% of the browse cover. However, the continued increase in sagebrush comes at the expense of grasses and forbs. The elevation of this site at 7,400 feet suggests that this area is more important as spring and fall range than winter range. Therefore, it would be more important to maintain a healthy understory of grasses and forbs. Trend for the herbaceous understory is down for grasses and up for forbs. Sum of nested frequency for perennial grasses declined and average cover of grasses fell from 14% in 1998 to only 3% in 2003. Sum of nested frequency for perennial forbs increased 33% and average cover rose from 6% in 1998 to 9% in 2003. The improvement comes from significant increases in wild onion, sego lily, desert parsley, and foothill deathcamas, all bulb or large tap root forbs. Overall, the herbaceous trend is considered slightly down due to significant declines in the nested frequency of Letterman needlegrass, bottlebrush squirreltail, and mutton bluegrass, combined with the major loss of perennial grass cover (14% to 3%).

TREND ASSESSMENT
soil - stable (3)
browse - up (5)
herbaceous understory - slightly down (2)

HERBACEOUS TRENDS --
Management unit 30 , Study no: 26

| Type | Species | Nested Frequency | | | Average Cover % | |
|---|---|---|---|---|---|---|
| | | '92 | '98 | '03 | '98 | '03 |
| G | Agropyron cristatum | $_{ab}$17 | $_{a}$5 | $_{b}$30 | .06 | .33 |
| G | Agropyron intermedium | 39 | 46 | 28 | 3.02 | .81 |
| G | Agropyron smithii | $_{b}$110 | $_{a}$29 | $_{a}$43 | .21 | .29 |
| G | Bromus tectorum (a) | - | 5 | - | .15 | - |
| G | Koeleria cristata | $_{b}$32 | $_{ab}$27 | $_{a}$10 | .74 | .05 |
| G | Poa bulbosa | $_{a}$- | $_{a}$11 | $_{b}$23 | .33 | .51 |
| G | Poa fendleriana | $_{b}$144 | $_{b}$162 | $_{a}$71 | 5.16 | .55 |
| G | Poa secunda | $_{b}$44 | $_{a}$3 | $_{a}$6 | .00 | .15 |
| G | Sitanion hystrix | $_{b}$153 | $_{b}$138 | $_{a}$31 | 2.67 | .26 |
| G | Stipa lettermani | $_{b}$65 | $_{b}$61 | $_{a}$20 | 1.72 | .13 |
| Total for Annual Grasses | | 0 | 5 | 0 | 0.15 | 0 |
| Total for Perennial Grasses | | 604 | 482 | 262 | 13.94 | 3.09 |
| Total for Grasses | | 604 | 487 | 262 | 14.09 | 3.09 |
| F | Achillea millefolium | 3 | - | - | - | - |
| F | Agoseris glauca | $_{b}$24 | $_{a}$11 | $_{a}$10 | .05 | .10 |
| F | Allium acuminatum | $_{a}$158 | $_{b}$267 | $_{c}$302 | 2.50 | 6.21 |
| F | Antennaria parvifolia | $_{b}$111 | $_{a}$38 | $_{a}$19 | .71 | .17 |
| F | Arabis spp. | 9 | 3 | 2 | .01 | .00 |
| F | Astragalus agrestis | $_{b}$10 | $_{b}$13 | $_{a}$- | .12 | - |
| F | Astragalus argophyllus | $_{ab}$1 | $_{b}$6 | $_{a}$- | .04 | - |

| Type | Species | Nested Frequency | | | Average Cover % | |
|---|---|---|---|---|---|---|
| | | '92 | '98 | '03 | '98 | '03 |
| F | Astragalus spp. | 8 | - | 2 | - | .00 |
| F | Balsamorhiza sagittata | - | - | 2 | - | .03 |
| F | Castilleja linariaefolia | - | - | 1 | - | .00 |
| F | Calochortus nuttallii | $_{a}$11 | $_{a}$12 | $_{b}$74 | .05 | .39 |
| F | Cirsium wheeleri | 5 | 7 | - | .06 | - |
| F | Comandra pallida | - | - | 6 | - | .06 |
| F | Collinsia parviflora (a) | - | 61 | 68 | .18 | .35 |
| F | Crepis acuminata | - | 3 | 3 | .01 | .00 |
| F | Delphinium nuttallianum | - | - | 7 | - | .03 |
| F | Descurainia pinnata (a) | - | - | 3 | - | .15 |
| F | Epilobium brachycarpum (a) | - | $_{b}$27 | $_{a}$- | .10 | - |
| F | Erigeron eatonii | $_{b}$56 | $_{a}$7 | $_{a}$2 | .21 | .01 |
| F | Erigeron pumilus | $_{a}$4 | $_{b}$13 | $_{a}$4 | .06 | .01 |
| F | Eriogonum umbellatum | $_{b}$76 | $_{a}$28 | $_{a}$21 | .41 | .07 |
| F | Gayophytum ramosissimum(a) | - | - | 4 | - | .01 |
| F | Haplopappus spp. | 1 | - | - | - | - |
| F | Hymenoxys richardsonii | 4 | - | - | - | - |
| F | Lomatium spp. | $_{a}$1 | $_{a}$6 | $_{b}$102 | .03 | .67 |
| F | Lupinus argenteus | 2 | - | - | - | - |
| F | Machaeranthera canescens | 3 | - | 2 | - | .00 |
| F | Microsteris gracilis (a) | - | 1 | - | .00 | - |
| F | Penstemon caespitosus | 1 | - | - | - | - |
| F | Phlox longifolia | 7 | 6 | 3 | .03 | .01 |
| F | Polygonum douglasii (a) | - | $_{b}$77 | $_{a}$12 | .21 | .04 |
| F | Ranunculus testiculatus (a) | - | - | 8 | - | .02 |
| F | Sphaeralcea coccinea | 3 | 1 | - | .00 | - |
| F | Tragopogon dubius | - | 3 | - | .00 | - |
| F | Viguiera multiflora | 1 | - | - | - | - |
| F | Zigadenus paniculatus | $_{b}$93 | $_{a}$69 | $_{b}$94 | .67 | 1.01 |
| Total for Annual Forbs | | 0 | 166 | 95 | 0.50 | 0.57 |
| Total for Perennial Forbs | | 592 | 493 | 656 | 5.01 | 8.81 |
| Total for Forbs | | 592 | 659 | 751 | 5.51 | 9.39 |

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 30 , Study no: 26

| Type | Species | Strip Frequency '98 | Strip Frequency '03 | Average Cover % '98 | Average Cover % '03 |
|---|---|---|---|---|---|
| B | Amelanchier utahensis | 12 | 14 | 1.54 | 1.52 |
| B | Artemisia tridentata vaseyana | 93 | 95 | 9.15 | 14.67 |
| B | Cercocarpus ledifolius | 2 | 1 | .15 | .85 |
| B | Cercocarpus montanus | 0 | 1 | - | - |
| B | Chrysothamnus depressus | 29 | 17 | .42 | .10 |
| B | Gutierrezia sarothrae | 45 | 44 | .39 | .40 |
| B | Opuntia spp. | 17 | 15 | .31 | .33 |
| B | Pinus edulis | 2 | 3 | .38 | .38 |
| B | Purshia tridentata | 29 | 23 | 4.09 | 1.97 |
| B | Quercus gambelii | 5 | 7 | .56 | .18 |
| B | Tetradymia canescens | 4 | 0 | .03 | - |
| Total for Browse | | 238 | 220 | 17.04 | 20.43 |

CANOPY COVER, LINE INTERCEPT --
Management unit 30 , Study no: 26

| Species | Percent Cover '03 |
|---|---|
| Amelanchier utahensis | 2.36 |
| Artemisia tridentata vaseyana | 17.23 |
| Cercocarpus ledifolius | .46 |
| Chrysothamnus depressus | .06 |
| Gutierrezia sarothrae | .46 |
| Opuntia spp. | .86 |
| Pinus edulis | .26 |
| Purshia tridentata | 1.46 |
| Quercus gambelii | .80 |

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 30 , Study no: 26

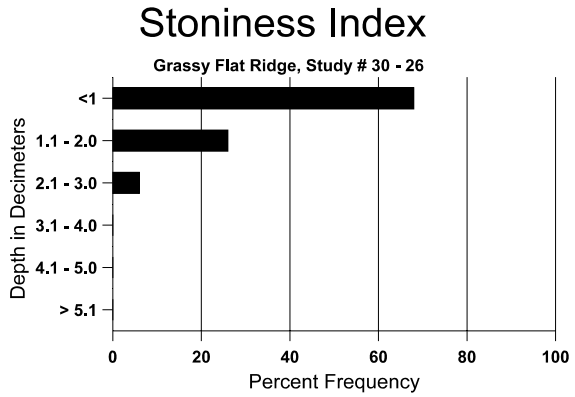
| Species | Average leader growth (in) '03 |
|---|---|
| Artemisia tridentata vaseyana | 1.2 |
| Purshia tridentata | 1.0 |

BASIC COVER --
Management unit 30 , Study no: 26

| Cover Type | Average Cover % | | |
|---|---|---|---|
| | '92 | '98 | '03 |
| Vegetation | 9.75 | 37.62 | 35.23 |
| Rock | 28.75 | 35.28 | 36.70 |
| Pavement | 17.75 | 5.62 | 3.02 |
| Litter | 25.00 | 29.13 | 17.67 |
| Cryptogams | 0 | .15 | .06 |
| Bare Ground | 18.75 | 19.05 | 18.20 |

SOIL ANALYSIS DATA --
Management unit 30, Study no: 26, Study Name: Grassy Flat Ridge

| Effective rooting depth (in) | Temp °F (depth) | pH | %sand | %silt | %clay | %0M | PPM P | PPM K | ds/m |
|---|---|---|---|---|---|---|---|---|---|
| 11.6 | 61.6 (15.5) | 5.8 | 36.0 | 31.4 | 32.6 | 1.5 | 7.2 | 83.2 | 0.5 |




PELLET GROUP DATA --
Management unit 30 , Study no: 26

| Type | Quadrat Frequency | |
|---|---|---|
| | '98 | '03 |
| Sheep | 2 | - |
| Rabbit | 3 | 1 |
| Deer | 31 | 16 |
| Cattle | 4 | - |

| Days use per acre (ha) | |
|---|---|
| '98 | '03 |
| - | - |
| - | - |
| 32 (79) | 52 (129) |
| - | 7 (18) |

BROWSE CHARACTERISTICS --
Management unit 30 , Study no: 26

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| Amelanchier utahensis | | | | | | | | | | | |
| 82 | **200** | - | - | 200 | - | - | 100 | 0 | 0 | 0 | 20/24 |
| 92 | **333** | - | - | 333 | - | - | 20 | 80 | 0 | 0 | 29/26 |
| 98 | **380** | 20 | 20 | 360 | - | - | 32 | 47 | 0 | 0 | 38/40 |
| 03 | **360** | 20 | 80 | 140 | 140 | 40 | 0 | 94 | 39 | 11 | 31/34 |
| Artemisia tridentata vaseyana | | | | | | | | | | | |
| 82 | **2333** | - | - | 2200 | 133 | - | 6 | 0 | 6 | 6 | 11/18 |
| 92 | **6399** | 3733 | 3600 | 1866 | 933 | - | 22 | 9 | 15 | 4 | 18/21 |
| 98 | **7260** | 1400 | 3120 | 3860 | 280 | 620 | 21 | .82 | 4 | 4 | 24/26 |
| 03 | **13440** | 620 | 4440 | 8500 | 500 | 540 | 11 | 2 | 4 | .74 | 12/21 |
| Cercocarpus ledifolius | | | | | | | | | | | |
| 82 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **40** | - | - | 40 | - | - | 0 | 50 | - | 0 | 44/50 |
| 03 | **40** | - | 20 | 20 | - | 20 | 0 | 50 | - | 0 | 60/44 |
| Cercocarpus montanus | | | | | | | | | | | |
| 82 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 03 | **20** | - | - | 20 | - | - | 100 | 0 | - | 0 | -/- |
| Chrysothamnus depressus | | | | | | | | | | | |
| 82 | **1133** | - | 133 | 1000 | - | - | 0 | 0 | 0 | 0 | 7/9 |
| 92 | **3732** | 400 | 1666 | 1733 | 333 | - | 14 | 13 | 9 | 0 | 4/8 |
| 98 | **1680** | 40 | 340 | 1280 | 60 | - | 17 | 1 | 4 | 0 | 6/11 |
| 03 | **560** | - | 20 | 520 | 20 | - | 25 | 21 | 4 | 4 | 5/10 |
| Gutierrezia sarothrae | | | | | | | | | | | |
| 82 | **1332** | - | 1266 | 66 | - | - | 0 | 0 | 0 | 0 | 9/10 |
| 92 | **5199** | 466 | 1400 | 3733 | 66 | - | 0 | 0 | 1 | 0 | 12/7 |
| 98 | **2720** | - | 880 | 1840 | - | - | 2 | 1 | 0 | 0 | 7/6 |
| 03 | **3060** | - | 160 | 2800 | 100 | - | 0 | 0 | 3 | 2 | 4/5 |
| Opuntia spp. | | | | | | | | | | | |
| 82 | **200** | - | - | 200 | - | - | 0 | 0 | 0 | 0 | 6/15 |
| 92 | **399** | - | - | 333 | 66 | - | 0 | 0 | 17 | 17 | 7/9 |
| 98 | **380** | - | 20 | 320 | 40 | 40 | 0 | 0 | 11 | 11 | 7/20 |
| 03 | **420** | 20 | - | 320 | 100 | - | 0 | 0 | 24 | 24 | 6/14 |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| Pinus edulis | | | | | | | | | | | |
| 82 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **40** | - | 20 | 20 | - | - | 0 | 0 | - | 0 | -/- |
| 03 | **60** | 20 | 40 | 20 | - | 20 | 0 | 0 | - | 0 | -/- |
| Purshia tridentata | | | | | | | | | | | |
| 82 | **533** | - | - | 533 | - | - | 88 | 0 | 0 | 0 | 16/22 |
| 92 | **732** | - | 133 | 466 | 133 | - | 0 | 82 | 18 | 0 | 11/25 |
| 98 | **700** | - | 60 | 520 | 120 | 120 | 9 | 83 | 17 | 9 | 12/34 |
| 03 | **580** | - | - | 400 | 180 | 60 | 17 | 79 | 31 | 14 | 9/29 |
| Quercus gambelii | | | | | | | | | | | |
| 82 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 92 | **0** | - | - | - | - | - | 0 | 0 | 0 | 0 | -/- |
| 98 | **460** | - | 280 | 40 | 140 | 60 | 35 | 0 | 30 | 17 | 38/48 |
| 03 | **1240** | - | 1140 | 100 | - | 20 | 0 | 0 | 0 | 0 | 42/48 |
| Tetradymia canescens | | | | | | | | | | | |
| 82 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 92 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | **100** | - | - | 100 | - | - | 0 | 0 | - | 0 | 6/9 |
| 03 | **0** | - | - | - | - | - | 0 | 0 | - | 0 | -/- |